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TYPHUS OR SHIP FEVER,

WITH REMARKS.

BY WM. INGALLS, M.D.

Fellow of the Massachusetts, Rhode Island and New Hampshire Medical Societies; formerly Professor of Anatomy, Surgery and Physiology in Brown University.

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THE MUSCULAR FIBRE THE SEAT OF TYPHUS.

Logica definitio febris dari non potest.
Von Hildenbrand.

Neque etiam, ut cenceo, inflammationis.
W. I.

To the Editor of the Boston Medical and Surgical Journal.

Men of comprehensive minds, of deep research, and profound erudition, have failed to give a comprehensive and perfectly satisfactory definition of fever. Dr. Cullen, whose synopsis was, for a series of years, the standard work on nosology, acknowledges his inability to determine with precision the phenomena necessary to constitute fever, in a note on pyrexia, which runs thus :—

" Quod hic, et pluribus quæ sequuntur locis, nobis forsitan vitio verti possit, quodammodo hic obiter excusare liceat. Ita, dici potest ; pyrexias aliquando videri, quas nullus præcesserat horror, et pyrexias in quibus neque pulsus frequentior, neque calor major, quam in sanis esse solet ; characterem ideo datum neque verum, neque ubique adhibendum. Istiusmodi pyrexias, rarissime licet, aliquando videri negare nolo ; sed, in characteribus classium, ad species dignoscendas adhibendis, ut singulæ classis notæ in unaquaque specie conspiciantur, haud necessarium videtur, et sufficit, si earum pleræque in specie quavis adsint.

" Character idoneus quisque, plurium notarum sive symptomatum concursum notare debet, et male quidem cum veteribus Vogelius calorem auctum solum, et recentiores Sylvius et Cel. Boerhaavius pulsuum velocitatem solam, pro charactere pyrexiæ, sive febris ut vocant, posuerunt. Certe, qui dicunt febrim adesse, etsi pulsus nihilo naturali frequentior sit, ex aliis quam velocitate pulsuum signis febrem adesse judicant ; quod etiam plurium symptomatum notationem, in quovis charactere necessarium esse, ostendit.

"Porro, hic obiter observari velim, pulsuum velocitatem solam, pyrexiam vel febrem adesse nequaquam semper indicare; cum a causis externis plurimis pulsus fit naturali velocior, sine morbo, sive quavis functionum læsione. Hisce de pyrexiæ charactere quæstionibus, in charactere a nobis hic dato, quantum potuimus, prospectum est. Sed, in aliis classium et ordinum characteribus adeo felicem esse vix licet; et in characteribus plerisque, si ad species plerasque character recte adhiberi possit, paucas exceptiones non moror. Utilem plerumque fuisse mihi sufficit, ubique perfectum fore non spero."

In the following commentary on the term Pyrectica, in his Nosology, Dr. Good, from the "complexity" and contrariety of the symptoms, boldly declares a full and correct definition of fever cannot be attained.

"Pyretica is here used in its fullest collective sense, and consequently as importing *νόσηματα πυρετικα* or *πυρητα*, 'febres,' or 'morbi febriles;' terms better understood, perhaps, by themselves than by any definition that has ever been offered. In reality, no writer seems to have been fully satisfied with his own definition; and it is not extraordinary, therefore, that he should seldom have given satisfaction to others. The difficulty proceeds from the complexity of the symptoms that enter into the character of a fever, and the contrariety of many of them to each other in different stages of it, and the occasional absence of some that in other instances appear to constitute its leading features."

Dr. George Fordyce, in one of the best treatises on fever extant, says:—"Fever, of all other diseases, is that one in which a pathognomonic symptom is least to be depended upon."

"The great difference which prevails among febrile diseases, and the frequent changes occurring in the symptoms of the different kinds of fever, make it very difficult to offer a definition of fever that will be applicable to all its varieties."—(Hartmann's Acute Diseases, by Hempel.)

One great obstacle to a precise and satisfactory description of continued fever, is, in considering ephemera, synocha, synochus, and typhus, to be identical in their nature, and that they have a common origin; another obstacle, perhaps as great, is in considering synochus (which is the type that continued fever most commonly assumes in this city) to be a mixed or compound disease.

It is not a little remarkable, while Sauvages, Vogel and Cullen,

have distributed fevers into genera, and Dr. Good allows the genera of those writers no higher rank than that of species, Dr. Watson, among the more recent writers, instead of adopting the nosological arrangements of the above physicians, assumes the ground that the genera of the former and species of the latter are mere varieties of a specific disease.

"We hear," Dr. Watson says, "continually, in and out of the profession, different species of fever spoken of. By the public, typhus fever, brain fever, bilious, low, nervous. And systematic writers are to the full as particular: mucous fever, ataxic, adynamic, gastro-enteric, and so forth. Now, admitting that fever shows itself under various forms, I am persuaded that the effect upon the mind of all this subdivision is bad and hurtful. It encourages a disposition, already too prevalent, to prescribe for a disease according to its *name*. There is no line of genuine distinction between continued fevers that can be relied upon. They run insensibly into each other; and are traceable often to the same contagion." Here it seems, according to this doctrine, ephemera, synocha, synochus and typhus are traceable often to the same contagion; and, of course, admit of the same treatment; a doctrine, which, in a great measure, militates with the established mode of practice. That there is a specific difference, however, between these diseases, the Doctor virtually acknowledges in the following sentence. "Although fever is, as I have related, a specific disease, it assumes divers forms; and so dissimilar are some of its phases that they might seem to belong to totally different maladies."

Beside the defection of Drs. Good and Watson from the classification of the older nosologists, Dr. Southwood Smith proceeds further in the reduction of the genera, species and varieties; he does not hesitate to allege there is but one fever. "The more we investigate the subject," he says, "the more satisfied we shall become, that continued fever is one disease, and only one, however varied or even opposite the aspect it may present; but that it differs in intensity, in every different case, and that this, and this alone, is the cause of the different forms it assumes." These laudable attempts, however, to simplify or render less complex the classification of fevers, will not contribute much in affording a logical definition of fever, until the seat be ascertained with anatomical certainty.

Seat.—To illustrate my views in relation to the cause and seat

of typhus with more precision, a few preliminary remarks may not be inapplicable. There are, in my opinion, two kinds of fever, one originating from personal contagion, the other from causes which tend to stimulate the circulatory system to excess. Typhus is dependent on the action of the former, synocha is the result of the latter. As ephemera and synocha are the product of the same cause, I place them in the same category. Synochus is composed of synocha and typhus; but as a compound or mixed fever cannot exist at the same time, the term synochus should be expunged, and typhus substituted.

Though many instances may be cited, in which, from the beginning, symptoms of typhus are apparent, yet, at the onset of the fever, symptoms of synocha, which continue an indefinite period before the type of the disease can be ascertained, are most commonly predominant. It is on this ground nosologists have introduced into their systems, under the denomination of synochus, a compound disease. In accordance with their views, this generic title should, perhaps, be given to the continued fevers in this place. But the discrimination between the typhus and synochus appears to be too refined; because every disease is modified so as to correspond to its cause, and to the nature of the tissues morbidly affected.

For example: in eruptive fevers there is every variety of symptoms to be found in typhus. The former may be ushered in by high arterial action, or from the first the vital powers may be so languid as to preclude the possibility of a salutary re-action taking place by the efforts of nature or the assistance of remedies; or, at almost any period from their incursion, putrid symptoms may supervene; or, in their course, petechia and vibices may appear, and constitute a leading and menacing feature; but whatever symptoms, synochal or typhoid, may have the ascendancy, eruptive diseases are by no means altered in their nature. To be more particular, the impression originating from the variolous poison cannot produce the distinctive characters of any other disease. The virus of smallpox cannot generate typhus, no more than the cause of typhus can beget smallpox. In other words, however much, in its several stages, its fever may resemble that of other maladies, the smallpox is expressly a disease of its own kind and is not convertible. Acute fevers, also, of the continued form, are as much under the control of their causes, and as much modified by them, as those attributed to what is commonly called a specific virus.

The deduction then naturally follows, however various the symptoms may be at its attack, or in its course, the typhus, as well as the smallpox, always assumes ultimately its appropriate type. That some time frequently elapses before the true character of the disease be developed, cannot with propriety be advanced as an objection to this position; because from what occurs in the first stage of the disease, the existence of smallpox and other eruptive diseases cannot be predicted. For these reasons, the use of the compound term synochus, as being perhaps radically inapplicable to any kind of febrile disease, will be laid aside; and the continued fever of this place will be treated of under the title of Typhus.

Synocha.—The distinguishing characteristics of synocha are, great excitation of the vascular system, and the generation of heat in excess. These actions are independent of each other. The causes which operate on the hidden power of evolving animal heat in such a manner as to produce it in excess, do not necessarily occasion the high vascular action so conspicuous in synocha; nor is the production of animal heat necessarily dependent on vascular action; for in typhus, even where the vigor of the heart and arteries is much reduced, the heat is often elevated above its natural standard. On the other hand, a preternatural action of the circulatory organs may exist without causing any deviation from the natural temperature of the body. Hence, as animal heat, morbidly excited, cannot be the cause of producing vascular action or the reverse, the seat of the disease is rendered extremely obscure.

Between synocha and typhus, there is a generic distinction. Personal infection is an essential requisite in the constitution of the latter; the former never originates from the same source. There is a diversity in the symptoms and seat which forbids the supposition that these diseases are correlative, or that the synocha may degenerate into the typhus. The loss of strength in consequence of an attack of synocha, may become a predisposing cause of typhus, but the former can never be converted into the latter. The synocha, therefore, not having the same cause or the same seat, may be considered to be a disease of its own kind and not transmutable.

Causes.—Continued labor in a high temperature of the atmosphere; sudden transitions from heat to cold after violent exercise; intemperance, in the most comprehensive signification of the term; render

persons of a plethoric habit, or firm fibre, liable to an attack of synocha.

A Case.—The following is a case of synocha of a very high "grade." In a high state of temperature, a wood-carter of rather a firm fibre than a plethoric habit, having for several days labored from early in the morning to a late hour in the evening, became indisposed; his indisposition increased so fast, his employer called on me to visit him. It was in the morning of a very hot day.

Symptoms.—His symptoms were a full, hard, strong, and frequent pulse: the radial artery gave the sensation of being remarkably round, and did not readily yield to pressure: the dimensions of its calibre appeared to be preternaturally augmented: the heat was excessive: the skin dry and parched: thirst great. It seemed, unless soon relieved, his constitution could not sustain the violence of the assault.

Remedies.—Blood was let copiously from a large orifice in a vein, which, like the artery, seemed to be preternaturally distended, while the patient was standing; he was then stripped and laid upon the sacking bottom of a bed; buckets full of cold water fresh from the pump were successively poured upon him from head to foot, till the heat of the surface was abated and the pulse lowered. During the employment of these means, the patient was allowed to drink of cold water at pleasure. A solution of two ounces of sulphate of soda in two pounds of water was then ordered to be his constant drink, for the double purpose of operating as a cathartic and acting as a refrigerant, and a strict antiphlogistic regimen was enjoined and observed. In six or eight days the fever disappeared, and soon after the health of the patient was re-established.

Ephemera, or Febris Diaria.—This disease has been considered to be a variety of continued fever. It has been supposed to partake of the nature of intermittents; and also that continued fevers are composed of its diurnal repetition. To my understanding, these positions are problems that have not been satisfactorily solved. This disease is ranked by Dr. Cullen under the class Pyrexia, and order Febris continua; whereas, Dr. Good seems to consider it to be of the intermittent type. It is true Drs. Cullen and Fordyce describe the paroxysm of intermittent fever as affording the genuine character of Ephemera. The only reason that can be assigned for taking a paroxysm of intermittent fever to be an emblem

of the ephemera is, that the latter often consists of one paroxysm terminating within twenty-four hours, comprising a cold, hot, and sweating stage ; but its course, and in many respects the phenomena attending it, are at variance with this arrangement.

The ephemera, as it is alleged by the best authorities, may often be protracted beyond twenty-four hours, without losing its diurnal character, which in intermittent fevers never happens. It is even said it may be prolonged beyond the third day before it is entitled to the denomination of continued fever. That a fever, the solution of which sometimes happens in six, eight, twelve or twenty-four hours, should receive a station in the order of continued fevers, or that it may be protracted three days without losing its ephemeral character, by a fastidious logician would be considered a solecism. Nor, in my estimation, is the complexity of the subject relieved by Drs. Cullen and Fordyce, physicians of the first authority, describing the paroxysm of intermittent fever, as affording a perfect illustration of the ephemera.

As the symptoms of a paroxysm of intermittent are analogous to the ephemera, it may be admissible to take the former as a representation of the latter ; but as they owe their origin to different causes, it would have been better to have adhered to the description of the ephemera, properly so called.

However similar the symptoms of these diseases may appear, by close observation a distinction may be discerned.

The commercial intercourse between Boston and places where intermittents are endemial, has afforded to practitioners numerous instances of this disease. Frequently the first attack has taken place in our city ; but there is such a decided difference between fevers originating in this place and those arising from the agency of marsh miasmata, I do not recollect a single instance in which the faculty have been mistaken with respect to the nature of the disease.

In the intermittent, the symptoms are of a deeper "grade" ; the lassitude, stretching and yawning, which usually announce the attack, are more marked ; the cold fit in duration and intensity is greater, and is accompanied by a more severe tonic or clonic spasm of the diaphragm and abdominal muscles. The hot stage, the burning and frequent heat, is perhaps peculiar to this disease ; even the sweating stage may be distinguished by its being copious, and flowing in large FLUID drops ; and the subsequent debility is less.

Hence we must look to other sources for the origin of the ephemera, than to marsh miasma. These are chiefly exposure to atmospheric vicissitudes, a check of perspiration from "catching cold," inordinate exercise, and unusual excitation of the system arising from the operation of the passions. Great mental excitation, from whatever cause, will produce the symptoms of ephemera, without any evidence of local inflammation, or any perceptible aberration of the mental faculties.

A Case.—In the year 1819, a patient came under my care, who labored, as the sequel proved, under the symptoms of an ephemera. On inquiry, I found him under great mental excitement. For a long series of years he had been very abstemious in his diet, and had abstained altogether from the use of fermented liquors and ardent spirits. He had been uniform in his hours of retiring to rest and rising in the morning. At the time, he had not suffered from atmospheric vicissitudes, or the influence of marsh miasma. On the morning prior to his delivering a discourse before a learned audience, circumstances, which were beyond his control, plainly indicated it was impossible to acquit himself with honor, or give satisfaction to his auditors. While contemplating this unpleasant prospect, the patient was attacked in the forenoon with an ague which lasted for half an hour. This was succeeded by a flushed countenance; great heat and an anxious attention to the progress of the disease. The natural firmness of the patient, and the confidence he reposed in his physician, enabled me to refrain from the employment of any active remedy: rest and tranquillity of mind were however strictly enjoined. During this period, the artery in the wrist was, to the superficial touch, round, hard, and full, but easily compressible. With the exception, if it can be termed as such, of the attention being diverted from the usual train of thought by watching the progress of his symptoms, the functions of the sensorium were not in the slightest degree impaired. Between two and four o'clock the next morning, a diaphoresis, by no means profuse, ensued, which was followed by a quiet slumber, from which at the usual time he awoke somewhat refreshed.

The next day, in consultation with a physician, we came to the conclusion, if depletion by copious detraction of blood and the use of cathartics had been resorted to, a state of exhaustion would have been the result, from which the patient would not, in all probability, have recovered.

The compressibility of the pulse was what induced me to abstain from depletion; having observed in fevers, when the pulse, though apparently full and strong, is easily compressible, and believing this state of the artery to be the result of nervous irritation and not of inflammation, I have uniformly avoided depletion. In short, I have conceived this mode of discrimination between irritation and inflammation to be an unerring guide in the treatment of fevers, so far as it respects depletion.

This case, it is evident, could not be traced to the influence of malaria or human effluvia, nor had local inflammation an agency in its production; but it undoubtedly arose from a general excitation of the nervous system.

Hence it is obvious, cases of ephemera may exist independent of the agency of miasma, and, of course, it cannot be deemed as partaking of the nature of intermittents. On this account I prefer the ordinal arrangement of pyrexia by Cullen, to the classification of Good.

It is allowed by every authority that has come under my notice, and it is granted by Good himself in his Study of Medicine, a diurnal repetition of the ephemera for a competent length of time is essential to the production of continued fever. This, however, I conceive to be an assumption more ingenious than sound. In my opinion, every disease, to be entitled to generic distinction, must have its seat in a different organ or class of organs. Cases of typhus must have come under the cognisance of every practitioner of medicine, in which symptoms of ephemera, if at all, have scarcely been discernible. Hence the ephemera loses its generic title as soon as symptoms of typhus appear, and to suppose its diurnal repetition to be essential to the explanation of the remissions and exacerbations of typhus does not appear to be well founded or defensible.

It will be allowed to be hardly debateable ground that there is a close resemblance between ephemera and synocha, but the analogy between the ephemera and typhus will not be so readily conceded. Even the synocha; unless it be identical with the ephemera, we need not be under the necessity of allowing it to consist of a daily return of the latter, as all the forms and varieties of disease depend on certain impressions made on various organs; but it is not philosophical or necessary to make diseases which widely differ in their origin and seat, to be the same.

In every acute disease there is a tendency to remissions and exacerbations. In phlegmonous and erysipelatous inflammations these remissions are manifest, especially every third day; and we find the same remark appertains to rubeola, variola and other diseases. In the febris hectica also, in which the remissions and exacerbations alternate with remarkable regularity and uniformity, it cannot, it is presumed, be supposed to consist of the quotidian return of the ephemera, which is universally believed to be an inflammatory affection and to be independent of a local cause.

From these additional considerations, I view the doctrine that continued fevers are composed of a diurnal repetition of ephemera to be more imaginary than real.

I have, in watching the progress of obscure febrile diseases, imagined that some of them had their seat in the inner membrane of the aorta. I had an impression, early in my dissections, that the tissue alluded to partook of the nature of the mucous membrane that lines the hollow organs, and the analogous membrane which covers the surface of the body. Whether the inflammatory state of the inner membrane of the aorta be the seat of synocha, I have not had it in my power to substantiate or deny. But, if I may be indulged in conjecture, in diseases of long continuance accompanied with fever, it has appeared to me, there has been a low degree of inflammation of the membrane covering the semilunar valves and lining the aorta. This affection has happened to patients who have been subjected to a long course of mercury, especially for the cure of lues veneriæ. It is known the circulatory organs become impaired after the constitution has suffered from the effects of venereal disease, which in this country is treated with mercury. The inflammation may be so graduated as not to destroy life, but to affect the subjacent parts; hence the cartilages of the valves become indirectly diseased, and eventually shrunken, so as to disturb the functions of the organs of circulation. In autopsies, I have seen the aorta inflamed as far as its curvature, and sometimes beyond, but how far this had any agency in the dissolution of the patient I am not able to decide.

Since the appearance of Clutterbuck's work on fever, in which he assumes the ground that the brain is the seat of continued fever, the attention of physicians has been called to the influence the nervous system exerts on the organism; many of whom have placed it

in a commanding attitude, and invested it with powers sufficiently ample to explain all the phenomena that occur in health or disease.

It seems, according to Dr. Good, Dr. Clutterbuck, from a suggestion of Dr. Fordyce, in his Dissertations on Fever, the mental powers are in some degree weakened or disordered, has assumed that the inflammation of the brain, or its membranes, is the cause of fever; which Dr. Good indirectly and rather sarcastically rejects by saying, and "consequently as being nothing more nor less than a *species* of phrenitis."

From a remark made by Dr. Clutterbuck, in the sixteenth number of Braithwaite's Retrospect, on the subject of the prevalent fever, he still adheres to the same opinion. "In typhoid fever," the doctor says, "the brain was the organ primarily and essentially affected." In the same number, Dr. Kennedy, after describing, in very strong terms, the inroads made on the brain by fever, has the following passage: "In making these remarks, I would not have it supposed that I am an advocate for the theory of fever advanced by Clutterbuck; for I believe that the state of the brain described is secondary to the cause of fever itself, whatever it may be. It is, in point of fact, a complication of the disease; but certainly a very important one." Dr. Watson, in his Lectures on the Practice of Physic, gives countenance to the theory of Dr. Clutterbuck, in the following sentence: "These preliminary symptoms result apparently from an altered condition of the *nervous system;*" the cause that produces the preliminary symptoms must inevitably be the same that produces those that occur in the several stages of the disease; and it is not a little extraordinary, in the very next sentence he adds, "The poison in the blood disturbs the functions of animal life before it causes any palpable derangement in the mechanism of the circulation."

In his work on the fevers of the United States, Dr. Bartlett has shown that, in Great Britain, there is a class of practitioners, who maintain that the miasm of typhus is primarily made on the nervous system. "In typhus," the doctor says, "there is no constant and uniform lesion of the solids, to which the symptoms can be referred. We certainly have here, if no where else in the nosologies, a general disease; an *essential* fever. In regard to its theory, and especially to the primary and fundamental disturbance, which, in its turn, gives rise to the subsequent and connected phenomena, the

sum of which constitutes the disease, British medical philosophers are mostly divided into two classes, the solidists and the humoralists. More strictly, we might call them the neuropathists and the hemopathists. The first maintain, that the impression of the morbid poison is primarily made upon the nervous system; the latter maintain, that this impression is made upon the blood." Dr. Watson claims to belong to the class of the hemopathists. The blood, no doubt, is susceptible to the impression of morbific agents. When the digestive organs are rendered incapable of converting unwholesome food into healthy chyle, the blood becomes vitiated, and then exerts a deleterious influence on the solids. In the scurvy, for instance, it is thin and surcharged with salts, and "readily induces," says Vogel, "liquefaction of the tissues (ulcerative destruction), without any trace of re-action or inflammation. The blood of persons addicted to intoxication belongs to the same category." The cause and mode of cure of scurvy come more within the sphere of our understanding, than almost any other disease; persistence in unwholesome food producing the former, and the substitution of a nutritious diet the latter. Hence in the treatment of morbid derangements of the system, from whatever cause they may proceed, particular attention to diet and regimen is always beneficial, and, in many instances, indispensable. Vogel, in his Pathological Anatomy, strongly insinuates, that the seat of typhus fever as well as scurvy is in the blood, in the following extract: "The salts, when artificially added, lessen the tendency to coagulation, and the latter (the alkaline salts) altogether destroy it. Thus, in a case of putrid typhoid fever, Schever found carbonate of ammonia in the blood, which was black and pitchy, and did not coagulate into a solid clot, but merely formed a diffluent saline mass." But there is no parallelism between these diseases, either in their cause, symptoms, course, termination, or mode of cure.

It has long been my opinion, the constituent parts of the human body formed a living aggregate subjected to the control of the vital principle; the solid bone, the cartilage, the tendon—which are destitute of red blood, nerves, and absorbents—and the most volatile and fluctuating fluids, are as much subject to its laws as the muscle, the brain and the blood.

According to Cullen, Willis was the first who applied the term nervous to fevers of any kind, which the English used long before

it was adopted by physicians of other countries. Febris maligna hectica sive lues νευρωδης convulsiva, *Willis* de morb. convulsiv. cap. 8. Hoc est exemplum, ni fallor, primum appellationis Νευρωδης, vel nervosæ, febribus quibusvis datæ ; quam protinus Angli, non tumen nisi super admodum aliarum règionum medici, usurpati sunt. Of the nosologists, Cullen is the first that has made any allusion to the nervous system in the description of typhus. In the nosological systems of Sauvages and Vogel, whose works did not appear until a century after Willis wrote, there is no symptom that appertains to this constituent of the body. Hence the brain, or the medulla spinalis, being the seat of typhus, is a theory of recent invention. That anatomical investigations do not support the doctrine that these organs, or indeed any part of the economy, constitute the seat of typhus, we have the authority of Morgagni, Fordyce, and J. B. S. Jackson of Boston. The latter gentleman, Professor of Pathology in Harvard University, in whose talents and accuracy in the investigation of morbid structures this community places implicit confidence, says, the appearances on dissection are of a "negative character." Dr. Fordyce, not finding any morbid alteration in the tissues, infers that "fever is a disease that affects the whole system," "but *that it does not affect the various parts of the system uniformly and equally.*" Since Clutterbuck advanced the theory, that the inflammation of the brain and its membranes was the cause of typhus, it has become the fashion to ascribe all the operations going on in the economy to the agency of the nervous system ; and, indeed, to endow it with all the prerogatives of the principle of vitality. So far from being entitled to this pre-eminence, it is indebted to the principle of vitality for its existence. The encephalon is the organ of sensation, whereas the muscular system is that part of the human frame to which contractility or irritability, according to the acceptation of these terms, exclusively belongs.

Tonicity of the animal fibre is dependent on the force by which its molecules are brought into apposition by the law of affinity. Contractility is an inherent power, co-ordinate with or superadded to tonicity, by which the muscles, which are made up of a congeries of fibres, may contract so as to render them shorter and more compact. By the former the component parts are maintained in juxtaposition ; by the latter, under the influence of the will, the muscles are capable of performing their office with an energy in pro-

portion to the force with which the molecules of the fibre cohere. Thus, tonicity and contractility are vital properties, which in certain parts of living organized bodies,—independently of nervous influence,—execute movements more or less remarkable, whenever they are brought into action by the application of an exciting cause. These movements, "which characterize life, and require no organ," are found in the most simple organized bodies, as in the polypus, and in the muscular fibre of the most complicated in the animal series.

Tonicity is an essential quality of vitality; without it, all organized bodies would cease to live. When it is redundant or deficient, the power of muscular contractility is proportionably augmented or diminished. Its influence, however, is not limited to the muscular fibre;—it extends to every organic solid.

That tonicity and contractility exist, also, in certain vegetables, is exemplified in the sensitive plant: when green, it is vigorous;—the slightest touch will cause a rapid contraction of rows of leaves; then the branchlets; and eventually the branch; but when sallow, it is feeble, and requires some degree of roughness to cause a few leaves to contract. Hence the above — which are the only vital properties belonging to the zoophyte—reside in great activity in the sensitive plant.

When to the qualities essential to the production of muscular motion nervous influence be added, a new train of phenomena appears. In beings possessing a nervous system in its most simple form, there commences between it and the muscular a reciprocal action; and as we advance from the more simple to the more complicated living organized bodies, the ascendancy of the nervous over the muscular power becomes more and more perceptible, until we arrive at the highest degree in the animal scale:—at each grade the animal acquires a new—not a different—accession of powers.

Notwithstanding the important part the organs of sensibility perform in the animal economy, contractility or irritability, for they are convertible terms, presents the first indication of animal life. Many of the phenomena of life, beside contractility, namely, digestion, circulation, nutrition and growth, existed before the brain was formed; and, consequently, they cannot be the product of that organ, nor can their permanence be dependent on its influence. Contractility is an inherent and permanent property of the muscular

system, is always present in all the changes that take place in deviations from health, remains after dissolution, and does not disappear until decomposition commences. On the other hand, sensibility is often suspended during life, is extinguished at death, and as many of the actions of the body are performed independently of this attribute of the nervous system, it can by no means be the sole agent which directs and controls the functions in health and disease. Hence it appears the habit of ascribing to any of the constituent parts of the body powers they do not possess, tends to retard the progress of medical science and the attainment of a rational and judicious practice. There is a very interesting illustration of the suspension of sensibility during life, while contractility remains in full force, in the employment of anæsthesian preparations in surgical operations. In amputation of a limb, the muscles, as soon as divided, contract as vigorously as when the subject is in full possession of his senses.

The miasm of typhus acts with peculiar energy on the muscular system ; although in continued fever, from its commencement, and during its whole course, there is no feature more prominent than prostration of strength ; even in its mildest form, diminution of muscular power is its distinguishing characteristic ; yet it is difficult to reconcile this condition of the body with the prodigious efforts the patient is capable of making when in a state of delirium. In addition to these affections, there is a contrariety in the symptoms ; tonic and clonic spasms may exist at the same time ; the superior extremities may be agitated by subsultus tendinum and tremors, while the extensors of the toes are in a state of permanent contraction ; and by the successive contraction of the muscles the eyeballs are thrown into irregular and frightful movements, while the tongue is paralyzed, or immovable, from tonic spasm. From this diversity in the actions of the muscular system, I have, in accordance with the definition of fever by Sagar, added to diminished, depraved strength, Frigus, calor, pulsus frequens, respiratio aucta, viribus artuum imminutis, *depravatis*, vel viribus vitalibus pulsu et respiratione vix mutatis, virium artuum summa prostratio.

The extensive communication between the organs of circulation and the muscular fibre is remarkable. The heart, the central organ of circulation, stands at the head of the muscular or irritative sys-

tem, and the peripheric extremities of the arteries, composed entirely of the muscular fibre, pervade every part of the muscular system, and are endowed with an irritability little, if any, inferior to that of the heart. The extensive distribution of these minute vessels, and their coming in contact with every fibre, are circumstances of the utmost physiological importance, and show the intimate connection that exists between the muscles of voluntary motion and those appertaining to digestion and respiration, and the organs of circulation.

From what has been said, I feel strongly inclined to believe the seat of fever, especially the typhus, is to be found in the irritative system. On the dissection of two subjects that died at different stages of the fever, I was struck with the appearance of the muscles; in one they were unusually red, in the other grey; the first was the body of a young man, in which the muscles were well developed and large; he deceased on the thirteenth day; the second, a female, somewhat advanced, in which those of the extremities were round and compact, and were covered with moisture; she expired at the end of three weeks. These appearances first suggested to me the possibility the seat of typhus might be found to be in the muscular fibre; but as opportunities of refuting or confirming the suggestion have not presented, recourse has been had to the history of the malady for such authorities as might have a tendency to give it countenance, and also as precursory to the case I am about to relate.

It may not be improper to remark in this place, there is in Good's Nosology, a symptom relative to the pulse, which was a prevalent one throughout the case below, and which I have not found so expressly stated in any work that has come under my notice. It is as follows: "Pulse tense and hard, unusually quick, but fluttering."

Case of Typhus.—In preparing this case for the press, knowing your want of confidence in homœopathy, I have omitted the insertion of the remedies employed in the treatment, it having been conducted on the principles and practice of Hahnemann, with the exception of the occasional application of compresses wet with cold water to the forehead, and warm flannels to the feet. Finding, however, opium to have been used by the allœopaths and by myself,

I shall deviate from the course I had imposed upon myself, so far as to give an account of its effects in this case, and my opinion of its virtues as a therapeutic agent.

On Tuesday, the 19th of November, 1847, a gentleman, aged twenty-five, of light complexion and vivacity of disposition, who had been exposed to the influence of the miasm of the "ship fever," came under my care with typhus of the gravest type. On the Sunday previous he made an excursion into the country, where he became indisposed, arising from a cold, which he was conscious he had taken from exposure to damp air with his head uncovered. On Monday morning, after his return to the city, he was attacked with chills, pain in the back and limbs; a profuse perspiration was induced by Thomson's hot-drops, and a copious alvine discharge by a dose of Lee's pills. My first visit was made on Tuesday, when the symptoms were as follows: —

Tuesday.—Pain in the head in a spot on the right side near the vertex; tongue covered with a greyish coat, and moist, the tip red and turned up; pulse 110, full, frequent and hard.

Wednesday.—Pain near the vertex subsided; pain in the region of the intellectual faculties; tongue as yesterday; eruption round the mouth; respiration hurried; pulse 104.

Thursday.—Pain in the region of the intellectual faculties disappeared; pain over the frontal sinuses; frequent troublesome but ineffectual efforts as if to remove a lodgement of mucus from the posterior nares; tongue much the same; eruption round the mouth much enlarged, and converted into scabs; bloodvessels of the tunica-conjunctiva injected (this affection lasted through the disease); lachrymation continued several days and then ceased, but returned when the eyes were exposed to a strong light; respiration relieved; pulse 104; severe pains in the back and limbs.

[The pain in the region of the frontal sinuses, and the affection of the posterior nares, proceeding from an irritation of the mucous membrane caused by the exposure above mentioned, were undoubtedly incidental, and not a characteristic symptom of typhus.]

Friday.—Pain over the frontal sinuses ceased; flushings of the face, indicating a determination of blood to the head; tongue as usual; pain in the left side, and at the lower part of the thorax, occupying the region of the spleen; lying on the same side, rendered the pain insupportable; respiration hurried, producing great suffering; pain in the back and extremities increased.

Saturday.—The affection of the posterior nares continued; eruption round the mouth diminished and black, and soon after disappeared entirely; respiration relieved; a copious discharge of figured feces; pulse about the same it had been for several days past; no pain in the back and limbs.

[That pain in the back and limbs is not necessarily caused by a morbid state of the spinal cord, may be inferred from the fact, that, in myelitis, partial or even extensive inflammation of the spinal cord unattended with pain in these organs, may occur, that is, if tenderness in the region of the spine be an indication of such an affection of that organ. The most extensive affection of the spinal cord that has come under my notice, is the following case. A very elderly lady lost, in a very great measure, the entire use of her limbs. When in bed, she could not lie on either side, nor move either of her extremities, but when she was placed on her feet, she could walk. From the inability to make the slightest change of posture, she suffered great distress, but not the slightest pain; and, therefore, it may be concluded, that pain is not caused by a disordered condition of the nervous system. The patient soon recovered, from the remedies employed in the treatment of myelitis.]

Sunday.—Passed a pretty good night; affection of the posterior nares the same; tongue much coated, skin moist, with a black line extending from the root to the apex, which is red and turned up; pulse 110; breath very offensive.

Monday.—Offensiveness of breath not perceived; affection of the posterior nares less troublesome; black line in the tongue not visible; the appearance of a bran-like eruption about the neck and bosom, was first noticed.

Tuesday.—Sleeplessness, restlessness, and delirium at night; the bran-like eruption more conspicuous, extending over the cutaneous surface, from the neck to the feet; alvine discharge, mixed with urine of a dark brown color; feces yellow, thin, with an intermixture of a few solid yellowish particles.

Wednesday.—Rags burnt, smoke of which produced great anguish; delirium great; rush of blood to the head; respiration 32; pulse 124. Afternoon—delirium less; "head feels empty;" respiration 40; pulse the same.

Thursday.—Delirium through the night; a slight amelioration of the pulse; tongue dry, coat thick, black and adhered closely to its

surface; accumulation of sordes on the teeth, extending to the buccal cavity, roof of the mouth and fauces, proving very troublesome; it was removed with swab wet with water; had two dejections similar in appearance to the last.

Friday—Morning.—A high delirium last night; flushed face; respiration spasmodic; pulse quick and somewhat hard; lies on his back, head pressed deeply into the pillow; tonic spasm of the flexor carpi radialis et ulnaris, rendering their tendons tense; twitchings of the muscular fibres very perceptible to the hand; strong contraction of the extensors of the toes. Afternoon—respiration more labored; pulse 137; great irritation of the anterior nares. Evening, between nine and ten o'clock—respiration very different; pulse too rapid to be counted; delirium furious; large compress, very wet with cold water, with other remedies, in the course of an hour, moderated the violence of the symptoms.

Saturday.—Last night four men were actively employed in restraining his inordinate movements and preventing his escape from bed; this morning delirium less furious, and the other symptoms less violent. Afternoon—delirium high, frequent attempts to get out of bed and "go home;" subsultus tendinum; tremors; carpology; tongue thick red and pointed, without being coated. Evening—a well digested dejection, mixed with urine thick and white, which had been, during the whole course of the fever, of a black brown; subsultus tendinum subsided; moisture from the forehead to the feet. These symptoms being indicative of a crisis, the keeping of the room free from noise, and the suspension of medicine rigorously enjoined; prescription, however, was left to be given conditionally. [Every attention had hitherto been paid most scrupulously to my directions and prescriptions, even to a written account of every thing he had taken, and at what hours, during the intervals between my visits; but what transpired between this time and my visit on Sunday morning, I could obtain no account, except no medicine had been administered; it is with regret, therefore, I could not ascertain to what cause the unexpected state in which I found the patient on Sunday, might probably be attributed.]

Sunday Morning.—Attempts to escape from bed relinquished; lies on his back, head pressed in the pillow; face of deep red color; eyeballs rolling in every direction, especially upwards and inwards, concealing at times the cornea; cheeks hollow; nose sharp and

pointed; under jaw fallen and immovable; subsultus tendinum; tremors; carpology; locomotive organs moving in every direction; respiration nearly normal; subsultus tendinum and tremors prevented the character of the pulse from being ascertained with accuracy, but it was thought to possess considerable energy. [From the pulse still retaining some activity, the respiration being normal, the functions of digestion being not much impaired, and a partial crisis having taken place on the preceding evening, notwithstanding the unpromising symptoms above mentioned, I did not consider the case wholly desperate. Afternoon.—By the advice of Dr. Wesselhœft, I gave opium. Having prepared the following formula, R. Op., 2 gl. 30 pot., solve in aq. ʒ ij. Of this I gave four teaspoonfuls; it soon produced half an hour's tranquil sleep, but when the patient awoke, his symptoms were more violent than before; I gave another tea-spoonful of the solution; sleep again was procured for a quarter of an hour; afterwards half a teaspoonful without much effect; another medicine was substituted, with direction, if it did not afford any relief by three o'clock, to give one globule of opium of the 300 potency, which was accordingly done; after which he slept an hour and a half at one time, and had frequent short naps afterwards.]

Monday.—I made this morning's visit between 9 and 10 o'clock, and found a complete crisis had taken place; the delirium had subsided; slight subsultus tendinum remained; cutaneous surface soft, moist and pliable; the urine replete with the "matter of typhus;" debility extreme. The debility of the voluntary muscles was much greater than that of the brain. The mind of the patient was calm and composed; he answered questions promptly and naturally, and made known his feelings and wants without hesitation. On the other hand, he could not move a single voluntary muscle, except those of the eyes, deglutition and voice. May not this fact strengthen the opinion that the irritative system is the seat of typhus?

Early in my practice I received the impression, that in the treatment of typhus, opium and its preparations in the usual doses were injurious; that they served rather to produce irritation, than to tranquillize the disturbed actions of the system; accordingly, I abandoned their use. In the departure from my usual practice, in this instance, in the employment of opium, though it undoubtedly mitigated the symptoms, still it may be problematical how far its

agency was concerned in producing the complete crisis which ensued soon after its administration; and also how far it may be useful in the several stages of the disease. From tracing, however, its well known remedial power in restoring abnormal deviations of the sensitive, irritative, and formative systems, it may, I feel confident, become a paramount remedy in typhus or maculated fever. The great difficulty will be in apportioning the doses according to the nature of the symptoms at the time of making the prescription. It is a well known fact, that every medicine, however appropriately selected, will prove curative, or otherwise, according to the quantity administered. On the importance of opium as a remedy in continued fever, Dr. Watson observes: "There is one point in the treatment of fever, of exceeding importance and of some nicety; I mean the use of opiates. If they are given inopportunely, they are apt to puzzle and perplex the case. But, when judiciously administered, opium will often save a patient who would inevitably sink without it." In treating of typhus, Dr. Gerhard, of Philadelphia, also remarks: "When the insomnia had been tormenting and incessant, and the patient was exhausted by agitation and nervous restlessness, a small dose of morphia would generally calm the agitation and procure sleep. This advantage was so great, that we were induced to give opiates which were opposed to our ordinary notions of the proper condition of the system for their employment."

In the Boston Medical and Surgical Journal, there are a number of cases of typhus or maculated fever, communicated by J. B. Upham, M.D., which furnish much valuable information relative to morphia, as it was given in every stage of the disease, and its effects minutely recorded.

"Case I. On the 1st of July, morphia, 1-8 gr. nocte. 2d, Drowsed a little, but got no refreshing sleep during the night. This morning has still intense pain over the forehead, &c. 3d, Slept well on 1-8 gr. morphine. 5th, Morphine nocte, p. r. n. 6th, Took 1-4 gr. morphia; rested better during the night; still increasing prostration; pain more severe in the head. 13th, Slept well without the aid of morphia. 20th, Nothing unusual has occurred since last date. Convalescence has proceeded evenly and rapidly as could be expected in a previously enfeebled constitution." [It will be observed that the effects of morphia have only been noticed on those days when it was given by itself.]

"Case II." [As other medicines were given on the same day with the preparations of opium, their therapeutic properties may have been modified; still their effects are perceptible in two instances.] On the "10th day, morphia 1-16 repeated twice at intervals of an hour. 11th, Slept very little. Morphia in minute doses, p. r. n. 12th, Slept well towards morning — 1-8 gr. of morphia. 14th, Dover's powders, gr. v. nocte. 15th, Slept well. Observation—The readiness with which, in both the above cases, sleep was induced by *minute* doses of morphia, also demands notice." [Both these cases terminated in recovery.]

In the third case, opiates were exhibited every day, from the 5th up to the 18th; but as they were administered at the same time with other remedial agents, their medicinal effects could not be distinctly ascertained. A synopsis is omitted. In the rest of the cases, making in the whole eleven, the details of the treatment were not given; but they are rendered exceedingly important by a record of the cadaveric investigations. In his comments on the third and fourth cases, the doctor says: "The post-mortem developments in the two cases harmonize well. In neither was there *any decided lesions of the brain;* the presence of dark dissolved blood in the sinuses and veins, and the slight effusion beneath the arachnoid, are all that arrested the attention." The medical reader would be richly repaid for the time spent in the perusal of the whole.

In the last number of the British and Foreign Medico-Chirurgical Review, p. 319, are the following observations on tartar emetic and opium in the treatment of the maculated fever: —

"We had intended to comment at some length upon the treatment by tartar emetic and opium, in the delirium tremens condition, so often to be noticed in the dominant stage of maculated fever. We must pass the subject by, with only a few remarks. Dr. Graves, who first employed and recommended the treatment in question, states, in his 'Clinical Lectures,' that the medicine should not be given, in the bulk of cases, before the 10th or 11th day. But then, as will have been seen from our account, the 10th or 11th day forms precisely the period at which, in cases that do well, the symptoms, in our experience, at least, have subsided spontaneously; and sure we are, that we have seen instances quite as marked as those of Dr. Graves, where recovery took place without any *positive* treatment. Only on one occasion did we venture upon Dr.

Graves's plan. The case occurred in private practice; the patient was under thirty years of age, and in good general health before the attack,—an instance, in fact, wherein, according to our own notions, the periodicity of the disease becomes matter of demonstration; altogether, we thought the case a favorable one for testing the influence of the remedy. All the symptoms described by Dr. Graves became manifest about the eighth day, and, seeing no contra-indication, we at this time exhibited the tartar emetic and opium in a form prescribed by Dr. Graves himself, in his lectures; anxious to see if the dominant stage would be cut short, and how far the periodicity of the disease, as noticed in other such cases, would be interfered with. Some broken sleep succeeded, but no absolute mitigation of the symptoms; on seeing which, we left it off, after 24 hours' use, curious to notice the result of such disturbing influence. The febrile symptoms were, by at least two days, of longer duration than we had been accustomed to observe in seemingly analogous instances; and we could not help believing that our interference, by an active and powerful remedy, with the depurative efforts of the system, had protracted the process. Certainly the cases related by Dr. Graves were generally more prolonged than were those of an apparently similar character, that occurred in our own experience; we do not, however, deduce any practical conclusion from this circumstance. To do so would require very extensive data."

In the present want of the knowledge of the modus operandi of medicine, it may be esteemed presumption in me to attempt to explain the manner in which opium produces its effects on the economy; but a few suggestions in relation to this, one of the most important articles in the materia medica, and the most extensively used, may not be inapplicable to the design of this essay. It is well known that some pharmaceutical preparations will operate more directly and more intensely on one tissue, organ or apparatus, than on another; and on this ground classifications have been constructed; but owing probably to the imperfect knowledge of the manner in which medicine acts on the organism, none have been universally adopted. Again, their operation varies according to the quantity administered, and hence the adjustment of the doses to the exigences of the case, next the selection of the appropriate remedy, requires discriminating powers of the highest order. Opium, in the first place, operates exclusively on the muscular system, in general,

producing tonic spasm. An over-dose exerts a manifest influence on the circulatory and respiratory apparatus, the pulse becoming full, strong, and somewhat frequent, in proportion to the dose, and the time elapsed. The affection of the pulse may be perceived after a very moderate dose; and long before there is any impression made on the sensorium.

Observing the effects of opium in excessive doses first induced me to adopt the opinion, the muscular system was the part of the body upon which it first exerted its energy. The opium eater, who has indulged too freely, without being much exhilarated, has a great propensity to motion, as if to remove some powerful, irritating cause, or to allay uneasiness proceeding from an intrinsic, morbid state of the muscular fibre. Accordingly, the powerful and unremitting exercise of the muscles by locomotion, and the concussion they receive from emetics, are among the most effectual means of counteracting its deleterious effects. This position seems to derive confirmation from the succeeding cases.

Case I.—I was called to a child 18 months old, that had taken or chewed one pill or more of opium, of a grain each, which it had found in a drawer. On my arrival, the respiration was laborious, the intervals between inspiration and expiration were much protracted; the face turned quite purple with the rush of blood to the head, and a strong tendency to stupor was manifest. Among other applications, the vapor of cold water to the chest was the remedy principally relied upon. It had the effect of temporarily restoring respiration to its normal state; when this occurred, the application of the vapor was intermitted; but when the intervals between inspiration and expiration again began to be prolonged, recourse was had to the same means, and repeated, until these symptoms disappeared.

Case II.—Was that of a young man, who, it was said, had taken an ounce of laudanum. He was in a very torpid state, from which it was very difficult to arouse him. There happened to be present a captain of a vessel, a gentleman of intelligence and activity. I wished to immerse his feet in hot water; with this view I ordered a bucket of water scalding hot to be brought; we placed the young man in a chair. I gave the command of one leg to the captain, and took the other myself, and, as directed, we both plunged his

feet to the bottom of the bucket and out again as quickly as possible. It had the desired effect; it aroused him so that he could answer the questions put to him; we then gave him tumbler after tumbler full of warm soap suds, till he had vomited freely. Afterwards, by causing him to walk or run backward and forward from one end of the rooms to the other, for a number of hours, sometimes slapping his hand, and sometimes bastinading him with a book, his respiration became equable, when he was suffered to go to rest.

Case III.—I was desired to visit a man, between 10 and 11 o'clock at night, who had taken opium. Two of his neighbors had been called in. The patient was a tall, stout-framed man. It could not be ascertained how much he had taken; some pieces were found under his pillow. We took him forcibly from his bed, and compelled him to walk about the room by supporting him. Before we could procure any internal remedy, he was attacked with a general tonic spasm; his breathing was suspended, his pulse was full, strong, hard and tense, without being much accelerated; eyes fixed, determination of blood to the head, threatening a fatal issue. By the assistance of the gentlemen, his arm was soon corded, it being already bare, blood was let from a large orifice from a round turgid vein, while the patient was standing; the spasm was soon relieved. The emetic ordered not having arrived, a portion of salts, which was in the house, was given him, which soon proved emetic; and soon after, warm soap suds, which having been prepared, together with the solution of salts, had the effect of vomiting him freely. He begged to be permitted to lie down; as he was a truckman, and as he had been probably hard at work in the course of the day, I gave him liberty, on the condition that, provided the soap suds ceased to vomit him, he should again be exercised as before. Fortunately, the suds continued to have the desired effect; and on the next day I saw some macerated particles of the opium blended with the fluid just rejected from the stomach. From the application of cold water to the chest, hot water to the feet, and exercise, venesection and vomiting, with the auxiliary remedies, these cases terminated favorably.

It has been said, so complicated and involved are the actions of the constituents of the body, it is difficult to explain the modus operandi of medicine. Are the remedies employed in these cases simply derivative; or are these effects produced by directly subduing

the morbidly increased irritability of the muscular fibre, and in this way preventing any ulterior mischief to the brain ?

Finally, it may be inferred, the miasm of typhus acts as an irritant on the muscular system, whence all the symptoms of this formidable disease proceed ; and that opium, in appropriate doses, may be found to be more specific to it in all its varieties, than any other article in the materia medica.